FREQUENCIES AND PATTERNS OF ARRYTHMIAS IN ANTERIOR AND INFERIOR MYOCARDIAL INFARCTION

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ABSTRACT

Objectives: The objective of this study was to identify the frequency and clinical patterns of arrhythmias in anterior and inferior myocardial infarction (MI).

Study design: A descriptive study

Place and Duration of Study: This study was conducted at critical care unit of Combined Military Hospital Kharian cantonment from January 2006 to December 2006.

Patients and Methods: Hundred patients were included in the study that fulfilled the required criteria. They underwent detailed history taking and systemic examination. Patients were monitored through cardiac monitors and serial ECG recordings were taken especially if any rhythm disturbances were observed or if the patient suffered any symptom, till the time of discharge from the hospital. The relevant information was entered into a specially designed pro forma. All the data collected through the pro forma was analyzed through SPSS version 11 in terms of frequency, percentages and proportions.

Results: Premature ventricular contractions (PVCs) were the most common rhythm disturbance followed by ventricular tachycardia (VT). Both were more common in anterior myocardial infarction (MI) than inferior MI. Bradyarrhythmias were more common with inferior MI. PVCs usually manifested with chest pain, VT was accompanied by palpitations and dyspnoea. Atrioventricular (AV) blocks clinically presented as syncope.

Conclusion: PVCs are the most common rhythm disturbance after anterior and inferior MI. VT and ventricular fibrillation (VF) are frequent in anterior while bradyarrhythmias are common with inferior MI.

Keywords: Acute Myocardial Infarction, Arrhythmias, Ventricular Tachycardia, Complete Heart block

INTRODUCTION

Acute myocardial infarction (AMI) occurs when coronary blood flow decreases abruptly. It usually occurs when a thrombotic occlusion of a coronary artery, previously narrowed by atherosclerosis, leads to the necrosis of the heart muscle [1]. Apart from other complications like cardiac failure and muscle damage arrhythmias are now recognized as major contributors to mortality.

Ischemic heart disease (IHD) is the leading cause of morbidity and mortality world wide [2-4]. Atherosclerotic coronary artery disease (CAD) causing myocardial ischemia may manifest itself either as acute myocardial infarction, unstable angina, effort angina or sudden death. Among these the most life threatening is AMI and its associated complications [5, 6]. Similar to the rest of the world, IHD is a leading cause of death in Asian countries too, including Pakistan [7, 8]. The incidence of AMI is increasing in our population [9].

Although regarded as modern disease myocardial infarction was clearly recognized before the modern era as back as 1761. The complete symptomtology was however described in 1912 [10, 11].

AMI is associated with a variety of arrhythmias ranging from bradyarrhythmias like complete heart block to ventricular fibrillation. Death from a ventricular tachyarrhythmia in the setting of AMI has historically been one of the most frequent causes of sudden death [12, 13]. In a 1985 report, for example, 60 percent of deaths associated with AMI occurred within the first hour were attributable to ventricular arrhythmia, in particular ventricular fibrillation [14, 15]. However, subsequent

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improvements in arrhythmia detection have had a major impact on the outcome of all types of arrhythmias associated with AMI. As a result, both arrhythmic and overall in-hospital mortality have fallen significantly [16, 17].

This study aims to help clinicians in treating patients with AMI, highlighting the clinical presentation and types of arrhythmias in our working conditions so that adequate measure and protocols can be formulated to decrease morbidity and mortality.

PATIENTS AND METHODS

This descriptive study was conducted at Combined Military Hospital Kharian cantonment from January 2006 to December 2006. The study was approved by the research and ethics committee of the hospital. All the patients gave their written informed consent.

During the study period all adult patients of either sex reporting to the hospital with severe chest pain of more than 30 min duration and ST segment elevation equal to or more than 1 mm (0.1mv) in two of these leads: V1-V4 (anterior Myocardial infarction) and II, III, avF (Inferior Myocardial infarction) and rise in serum creatinine kinase (CPK) more than twice the normal value with CK-MB fraction more than 6% of CPK value were included in the study on the basis of non probability sampling. Patients with a known history of arrhythmias or on anti-arrhythmic drugs, confounding features on pretreatment ECG (for example, bundle branch block), pregnant ladies, and patients who refused to participate in the study were excluded.

Subjects were carefully selected keeping in view the inclusion and exclusion criteria mentioned above. Detailed history was taken. All patients were asked about past history of hypertension, diabetes mellitus, previous episodes of angina pectoris, drug history and family medical history. Then relevant physical examination was performed.

The first ECG and set of cardiac enzymes including CPK and CK MB fraction was performed at the cardiology emergency reception. After giving the first aid patients were shifted to coronary care unit where they received further treatment according to existing protocols.

During their stay at the hospital patients were monitored continuously by cardiac monitors and serial ECGs were performed. Whenever the patient experienced any arrhythmia it was noted and if possible recorded, accompanying symptoms were also noted. All this information was recorded through a specially designed pro forma. Patients were disposed off according to existing regulations. There was no follow up. All the data collected through the pro forma was entered in statistical program SPSS version 11 and analyzed in terms of frequency, percentages, proportions and ratios.

RESULTS

One hundred patients were enrolled in this study that fulfilled the selection criteria. There were no missing values. Out of 100 patients 67% were male and 33% were female. Anterior wall MI was observed in 52% of patients while 48% suffered inferior wall MI. Almost every patient suffered from some form of arrhythmia. Frequency of all the arrhythmias were given in table 1. PVCs were the most common of rhythm disturbance in both types of MI, a total of 56% as shown in Table 1. They were more frequent in anterior than inferior MI, 66.1% and 33.9% respectively. VT was the second most common i.e. 11% in both MI. This was also more frequent in anterior MI than inferior MI, 81.2% and 18.2 % respectively. Third degree AV block was the most frequent and was observed in 9% of cases. It was seen in 88.9% of inferior MI as compared to 11.1% in anterior MI.

Almost every arrhythmia manifested with symptoms (Table-2). Patients who had PVCs experienced chest pain in 55.4%, palpitations in 33.9% and pain epigastrium in 8.9% while 1% developed shock (Table 2). Patients who suffered VT experienced palpitations in 36.4%, dyspnoea in 27.3% and epigastric pain and chest pain was seen in

18.2% each. All of the patients who suffered VF developed shock i.e. 100% (Table 2). Patients who developed 3rd degree AV block experienced epigastric pain (22.2%), syncope (22.2%) and shock (33.3%).

discharge occour with an increased risk of total and SCD mortality in the first six months post-MI. This study demonstrated that PVCs were the most common arrhythmias in both anterior and inferior MIs which is consistent

Table-1: Frequencies of anterior and inferior MI in different arrhythmias.

Type of Arrhythmia	Diagnosis		Total (n= 100)
	Anterior (n=52)	Inferior (n=48)	
PVCs	37 (66.1 %)	19 (33.9 %)	56 (100.0 %)
VT	9 (81.2 %)	2 (18.2 %)	11 (100.0 %)
VT/VF	2 (100.0 %)		2 (100.0 %)
VF	2 (66.7 %)	1 (33.3 %)	3 (100.0 %)
Junctional Tachycardia	2 (66.7 %)	1 (33.3 %)	3 (100.0 %)
Sinus Bradycardia	2 (28.6 %)	5 (71.4 %)	7 (100.0 %)
AV	2 (50 %)	2 (50 %)	4 (100.0 %)
1st Degree block		4 (100.0 %)	4 (100.0 %)
2nd Degree block	1 (11.1%)	8 (88.9 %)	9 (100.0 %)
3rd Degree block			
Other	1 (100.0 %)		1(100.0 %)

n = 100 PVCs = Premature ventricular contractions, VT = Ventricular Tachycardia, VF = Ventricular Fibrillation, AV Block = Atrioventricular Block

Table-2: Frequencies of symptoms in each arrhythmia

Type of arrhythmias	Symptoms						Total
	Epigastric pain	chest pain	Palpitations	dyspnoea	shock	Syncope	
PVCs	5 (8.9%)	31 (55.4%)	19 (33.9%)		1 (1.8%)		56(100.0%)
VT	2 (18.2%)	2 (18.2%)	4 (36.4%)	3 (27.3%)			11 100.0%)
VT/VF	1 (50.0%)				1 (50.0%)		2 (100.0%)
VF					3(100.0%)		3 (100.0%)
Junctional tachycardia		1 (33.3%)	2 (66.7%)				3 (100.0%)
Sinus bradycardia	1 (14.3%)	3 (42.9%)	2 (28.6%)	1 (14.3%)			7 (100.0%)
AV block							
1st degree	1 (25.0%)	1 (25.0%)	2 (50.0%)				4 (100.0%)
		2 (50.0%)		1 (25.0%)		1 (25.0%)	4 (100.0%)
2nd degree	2 (22.2%)			2 (22.2%)	3(33.3%)	2 (22.2%)	9 (100.0%)
3rd degree							
Other				1(100.0%)			1 (100.0%)

PVCs = Premature ventricular contractions, VF = Ventricular Fibrillation, VT = Ventricular Tachycardia, AV Block= Atrioventricular Block.

DISCUSSION

PVCs are fairly common in patients suffering from heart diseases. Their significance in the peri infarction period is controversial, as they do not appear to predict ventricular fibrillation [9]. In comparison, frequent PVCs (>10 per hour) before hospital

with previous observations e.g. Atherosclerosis Risk in communities (ARIC) study and others which showed as high frequency as up to 93%.7 PVCs are usually asymptomatic and may accompany complaints such as heart sinking, chest pain or palpitation. The findings of this study were consistent with those of previous studies.

VT was the second most common arrhythmia in our study i.e. 11% in all MI which is comparable to other studies [12, 13]. It was also more frequent in anterior MI than inferior MI, 15.5% and 4.8% respectively. All patterns of VT including sustained, nonsustained, monomorphic and polymorphic were observed. Two patients subsequently developed VF. Patients who suffered from VT experienced dyspnoea, palpitations and pain epigastrium while those who progressed to VF went into shock. The frequency of VF in this study was 3 % which is also comparable to older studies [18, 19]. It was more frequent in patients with anterior MI than inferior MI. All patients went into cardiogenic shock.

Bradyarrhythmias and conduction disturbances are well recognized complications of acute myocardial infarction (MI). They are induced by either autonomic imbalance or ischemia and necrosis of the conduction system. Sinus bradycardia occurs in 15 to 25 percent of patients after acute MI [1-3]. It was seen in 7% patients in this study; frequency was higher in inferior wall MI i.e.71.4 %. Most patients complained of chest pain and palpitations.

AV blocks were frequently observed in our study. Complete heart block was seen in 9% of patients most had inferior MI (88.1%) only one patient with anterior MI had complete heart block (11.1%). Patients either had syncope, shock or dyspnoea. Most of these patients ended up in insertion of temporary pacemaker. Second degree block was seen in 4 patients (4%) it was seen only with inferior MI (100 %). Patients had chest pain and dyspnoea. One patient (25 %) developed syncope. First degree AV block was observed in both anterior and inferior wall MI with equal frequency i.e. 50 % each. The largest experience with high degree AV block in the thrombolytic era comes from a review of almost 76,000 patients with ST elevation MI enrolled in four large randomized trials of thrombolytic therapy (GUSTO-I, GUSTO-III, ASSENT-II, and GUSTO-IIb) [20]. The overall incidence of high degree AV block was 6.9 percent: 9.8 percent with inferior MI and 3.2 percent with anterior MI.

In another analysis, a sub study of the TRACE trial of trandolapril in acute MI evaluated 6657 patients, 41 percent of whom received thrombolytic therapy, complete heart block (CHB) occurred in 340 patients (5.1%) and of these the onset of CHB was within first two days after MI in 81 percent. Other studies show that about 40 percent of cases of AV block are due to either acute or chronic IHD [21]. It is estimated that approximately 20 percent of patients with an acute MI develop AV block: 8 percent with first degree; 5 percent with second degree; and 6 percent with third degree [22].

Junctional tachycardia is an arrhythmia arising from a discrete focus within the AV node or His bundle. Nonparoxysmal junctional tachycardia is typically transient, occurring within the first 48 hours of infarction and developing and terminating gradually. In one study where patients of MI were followed by 24 hour tape recordings, in the first 24 hours after admission to the coronary care unit, 12 of the 30 patients (40 percent) exhibited nonparoxysmal junctional tachycardia; in 5 the arrhythmia was not recognized by conventional monitoring techniques. For the subsequent 3 days, the incidence rate of the arrhythmia was 13 percent for the first 48 hours and 3 percent for 72 hours. The percentage was greater in those having anterior MI. In our study this arrhythmia was observed in 3% of patients, more frequent in anterior wall MI i.e. 66.7%. Patients experienced palpitations and chest pain which was transient and terminated spontaneously. No treatment was required.

CONCLUSION

This study, despite its shortcomings, suggests that PVCs are the most frequent of arrhythmias both in anterior and inferior MI. The other arrhythmias like VT, VF and junctional tachycardias are more frequent in anterior MI while bradycardia, sinus arrest and AV blocks were common in Inferior MI. Symptoms like syncope, shock and dyspnoea

are invariably accompanied with potentially fatal arrhythmias like VF and Complete heart block.

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